No. 18-422

IN THE

Supreme Court of the United States

ROBERT A. RUCHO, *et al.*,

Appellants,

v.

COMMON CAUSE, *et al.*,

Appellees.

On Appeal from the United States District Court for the Middle District of North Carolina

BRIEF OF *AMICI CURIAE* PROFESSORS WESLEY PEGDEN, JONATHAN RODDEN, AND SAMUEL S.-H. WANG IN SUPPORT OF APPELLEES

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INTEREST OF *AMICI CURIAE*[1]

Amici are scholars in various disciplines who study the effects of legislative line-drawing on elections. Using statistical analyses and computer modeling techniques, *amici* and others in the field have developed and honed a toolkit of quantitative methods that enable courts to reliably measure whether a legislative map is extreme relative to the great majority of maps that could arise through unbiased means. These quantitative methods permit a robust conclusion that invidious partisan considerations dominated in the districting process. Indeed, as *amici* explain below, there are many quantitative methods to support such a conclusion—and in the present case and other recent cases, they consistently point to the same conclusion.

Works and analyses by *amici* have been cited and relied upon by federal courts, as well as by other *amici* in this case.[2] In addition, Justices of this Court cited briefs submitted by the three *amici* in the opinions in *Gill* v. *Whitford*. See 138 S. Ct. 1916, 1933 (2018) (citing Brief of Heather K. Gerken et al. as *Amici Curiae* in Support of Appellees 27, *Gill*, 138 S. Ct. 1916 (No. 16-1161) (citing Sam Wang, Opinion, *Let Math Save Our Democracy*, N.Y. Times (Dec. 5, 2015), https://www.nytimes.com/2015/12/06/opinion/sunday/let-math-save-our-democracy.html)); *id.* at 1936

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[1] Counsel for all parties have consented to the filing of this brief. In accordance with Supreme Court Rule 37, *amici curiae* state that no counsel for a party authored this brief in whole or part and that no party, counsel for a party, or any other person other than *amici* and their counsel made a monetary contribution to fund the preparation or submission of this brief.

[2] *See, e.g.*, Br. of Bernard Grofman & Ronald Keith Gaddie as *Amici Curiae* in Support of Neither Party 18, 22.

(citing Brief of Political Geography Scholars as *Amici Curiae* in Support of Appellees 12–14, *Gill*, 138 S. Ct. 1916 (No. 16-1161)).

Notably, the methods discussed by *amici* are nonpartisan and will sometimes show that a challenged map was *not* gerrymandered. As detailed below, however, statistical analyses like those developed by *amici* confirm beyond a statistical doubt that North Carolina's map represents an intentional partisan gerrymander. Techniques developed by *amici* and relied upon by the district court below confirm that the district lines now before the Court are extreme outliers, leading to the firm conclusion that invidious partisan bias was a predominant factor in the drawing of North Carolina's legislative map.

Amici include Professors Jonathan Rodden, Wesley Pegden, and Samuel S.-H. Wang. Professor Rodden is a Professor in the Department of Political Science at Stanford University and the Director of the Spatial Social Science Lab at Stanford University. Along with Professor Jowei Chen (who participated as an expert in this case and whose work was extensively relied upon by the district court), Professor Rodden has used computerized modeling and legislative map sampling to assess the causes of electoral bias.[3] In addition,

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[3] Professor Rodden's relevant publications include Jowei Chen & Jonathan Rodden, *Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures*, 8 Q.J. Pol. Sci. 239 (2013) [hereinafter Chen & Rodden, *Unintentional Gerrymandering*]; Jowei Chen & Jonathan Rodden, *Cutting Through the Thicket: Redistricting Simulations and the Detection of Partisan Gerrymanders*, 14 Election L.J. 331 (2015) [hereinafter Chen & Rodden, *Redistricting Simulations*]; Ernesto Calvo & Jonathan Rodden, *The Achilles Heel of Plurality Systems: Geography and Representation in Multiparty Democracies*, 59 Am. J. Pol. Sci. 789 (2015); and Jonathan Rodden, *The Geographic*

Professor Rodden has developed an analytical approach that relies on statistical characterizations to examine how Democrats and Republicans are distributed throughout States, and that draws on cross-State comparisons to assess the effects of partisan geography on each State's legislative map, including on a district-by-district basis.[4]

Professor Pegden is an Associate Professor in the Department of Mathematical Sciences at Carnegie Mellon University. Professor Pegden and others have developed a method for testing, through computer simulations that examine the effect of billions of minute changes to legislative district lines, whether lines were drawn with a predominant intent of achieving partisan ends.[5]

Professor Wang is a professor of neuroscience and molecular biology at Princeton University, and faculty associate in the Program in Law and Public Affairs. He has developed statistical methods to analyze United States elections, and he is the author of several works

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Distribution of Political Preferences, 13 Ann. Rev. Pol. Sci. 321 (2010).

[4] *See* Nicholas Eubank & Jonathan Rodden, *Who Is My Neighbor? The Spatial Efficiency of Partisanship* (Feb. 21, 2019) (unpublished paper), http://www.nickeubank.com/wp-content/uploads/2018/07/EubankRodden_spatialefficiency.pdf [hereinafter Eubank & Rodden, *Who Is My Neighbor?*]; Nicholas Eubank & Jonathan Rodden, *Political Dislocation: A Voter-Level Measure of Partisan Representation and Gerrymandering*. (March 7, 2019) (unpublished paper), http://www.nickeubank.com/wp-content/uploads/2018/10/EubankRodden_dislocation.pdf [hereinafter Eubank & Rodden, *Political Dislocation*].

[5] Professor Pegden's relevant publications include Maria Chikina, Alan Frieze & Wesley Pegden, *Assessing Significance in a Markov Chain Without Mixing*, 114 Proc. Nat'l Acad. Sci. U.S. 2860 (2017).

on statistical methods to detect partisan bias in redistricting.[6]

SUMMARY OF ARGUMENT

This Court and its Justices have repeatedly condemned "partisan gerrymandering—the drawing of legislative district lines to subordinate adherents of one political party and entrench a rival party in power," *Ariz. State Legislature* v. *Ariz. Indep. Redistricting Comm'n*, 135 S. Ct. 2652, 2658 (2015)—as "[incompatible] with democratic principles," *id.* (alteration in original) (quoting *Vieth* v. *Jubelirer*, 541 U.S. 267, 292 (2004) (plurality opinion)). But the Court has over the years questioned whether there exist "'judicially manageable standards for resolving purely political gerrymandering claims.'" *Gill*, 138 S. Ct. at 1927 (quoting *Davis* v. *Bandemer*, 478 U.S. 109, 147 (1986) (O'Connor, J., concurring in the judgment)). As Justice Kennedy predicted in *Vieth*, however, "new technologies" have produced "new methods of analysis that make more evident the precise nature of the burdens gerrymanders impose on the representational rights of voters and parties." 541 U.S. at 312–13 (Kennedy, J., concurring in the judgment) (plurality opinion).

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[6] Professor Wang's relevant publications include Samuel S.-H. Wang, Brian A. Remlinger & Ben Williams, *An Antidote for Gobbledygook: Organizing the Judge's Partisan Gerrymandering Toolkit into Tests of Opportunity and Outcome*, 17 Election L.J. 302 (2018) [hereinafter Wang et al., *Antidote for Gobbledygook*]; Samuel S.-H. Wang, *Three Tests for Practical Evaluation of Partisan Gerrymandering*, 68 Stan. L. Rev. 1263 (2016); Sam Wang, Opinion, *Let Math Save Our Democracy*, N.Y. Times (Dec. 5, 2015), https://www.nytimes.com/2015/12/06/opinion/sunday/let-math-save-our-democracy.html.

This Brief discusses and categorizes some of the technologies and methods of analysis that now exist, and explains how they "facilitate court efforts to identify and remedy the burdens" of partisan gerrymandering. *Id.* at 313. Many measurement tools have been developed to assess quantitatively whether a legislative map is extreme—*i.e.*, outside the range of what could plausibly result through unbiased means. By demonstrating that a legislative map is more extreme than all or the great majority of possibilities that could be generated by a fair process, these tools permit a court to reliably identify and assess the effects of partisan gerrymandering.

Broadly, the tests can be divided into two categories: (1) those that identify inequality of opportunity, *i.e.*, a map drawn with the predominant intent to deprive a group of the ability to elect representatives; and (2) those that identify inequality of outcome, *i.e.*, a map with pronounced effects, in the form of durable distortion in the amount of representation. See Wang et al., *Antidote for Gobbledygook*, *supra* note 6, at 305–06. In each case, the measures examine the difference between the challenged map and what would occur under a districting process in which partisan interests are not the overriding consideration. In short, as described in this *amicus* brief, courts have a toolkit of objective, quantitative tools from which to draw in identifying and assessing the effects of partisan gerrymandering undertaken for the invidious purpose of subjugating a rival political party and its supporters.

The existence of multiple quantitative tools for assessing partisan gerrymanders enhances confidence in the accuracy of the results. Significantly, experience shows that the existing forms of analysis produce consistent, replicable results—confirming their

reliability. Indeed, in the significant gerrymandering cases that have come to this Court in recent years, every kind of quantitative evidence put forth has led to the same conclusion. As Justice Sotomayor observed during argument in *Gill*, for example, "every single social science metric" addressed in that case "points in the same direction." Transcript of Oral Argument at 16, *Gill*, 136 S. Ct. 1916 (No. 16-1161). So too here. Quantitative analysis of North Carolina's legislative map—including the analysis relied upon by the district court, as well as analysis in academic publications—consistently shows an extreme legislative map, intentionally drawn to subjugate the Democratic Party and its voters. See pp. 20–24, *infra*.[7] Moreover, as in *Gill*, Appellants offer no competing quantitative analysis suggesting that the North Carolina map is anything but a partisan gerrymander. See Br. for Appellants 41–46.

The suite of tools available for measuring partisan gerrymanders also means that it is possible to engage in reliable quantitative analysis of gerrymanders in a wide variety of situations. For example, as detailed below, some tests are appropriate for measuring gerrymanders on a statewide level, and some can be used to assess the impact of a legislative map in individual districts. Some tools are effective for measuring partisan gerrymandering in states with one heavily dominant political party, such as Maryland, while other tools are useful for assessing

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[7] *See also* Gregory Herschlag et al., *Quantifying Gerrymandering in North Carolina* (Jan. 10, 2018) (unpublished paper), https://arxiv.org/pdf/1801.03783.pdf (applying multiple gerrymandering measures to North Carolina legislative maps and concluding that all show extreme partisan gerrymandering).

closely contested states, such as North Carolina.[8] Multiple forms of analysis can be performed on the same legislative map to provide confirmation of the outcome. The Court is not called to enshrine one single metric. Instead, thanks to advances in the field of rigorous statistical examination of partisan gerrymanders, there now exists a versatile statistical toolkit to address the wide variety of circumstances that may arise in any of the 50 states. Wang et al., *Antidote for Gobbledygook*, *supra* note 6, at 302.

The existence of this toolkit puts the lie to Appellants' assertion that "efforts to measure the problem underscore that this whole undertaking is not a judicially manageable task." Br. for Appellants 43. Rather than address the full measure of quantitative analysis that *amici* and others in the field have developed and tested, Appellants single out one form of analysis—the efficiency gap—declare that it has "serious problems," and on that basis ask the Court to disregard the "whole undertaking" of quantitative analysis of legislative maps. *Id.* at 43–44. The Court should not accept Appellants' invitation. Certainly, it should not do so without understanding what measurement tools exist, and how they can be deployed as the lower courts grapple with the problem of partisan redistricting. That is the information that this Brief provides.

ARGUMENT

Although four members of the Court in *Vieth* were willing to abandon the search for a workable, reliable

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[8] For a description and categorization of multiple tests, including an explanation of how to match a test to particular circumstances, *see* Wang et al., *Antidote for Gobbledygook*, *supra* note 6, at 308–14 (Apps. A & B).

standard for assessing partisan gerrymanders, five were not. The lack of a standard at that time, Justice Kennedy wrote, "should not be taken to prove that none will emerge in the future." 541 U.S. at 311 (Kennedy, J., concurring in the judgment) (plurality opinion). Technological and analytical advances inevitably would be developed to enable courts to identify partisan gerrymanders in a consistent and objective manner, as Justice Kennedy recognized: "new technologies may produce new methods of analysis that make more evident the precise nature of the burdens gerrymanders impose," which would "facilitate court efforts to identify and remedy th[ose] burdens." *Id.* at 312–13.

Technology has indeed evolved. In *Gill* v. *Whitford*, Justice Kagan specifically recognized the work of *amici* in establishing whether a voter lives in a district that has been "packed or cracked." 138 S. Ct. at 1936 (Kagan, J., concurring). As Justice Kagan noted, one way a plaintiff may make this necessary showing is by producing an alternative map, or set of such maps, "comparably consistent with traditional districting principles—under which her vote would carry more weight" than under the actual districting map. *Id.* (citing Brief of Political Geography Scholars as *Amici Curiae* in Support of Appellees 12–14, *Gill*, 136 S. Ct. 1916 (No. 16-1161)). Such maps, she stated, "may shed light on vote dilution or its absence." *Id.*

This brief describes the type of work that Justice Kagan focused on in *Gill*—rigorous analytical methods that shed strong light in an area that was previously marked by murkiness. We first discuss the method on which Justice Kagan focused, and which was relied on by the court below in this case: comparison of the legislative map to a large set of computer-generated alternative maps. This analysis allows a reviewing

court to identify the extent to which the partisan advantage built into a specific redistricting plan goes beyond what would be expected if traditional redistricting criteria, along with other legal requirements such as the Voting Rights Act, had been the only considerations. In other words, one important output of this analysis is a measure of the effects that make the existing map an extreme outlier as compared to maps that could have been drawn without nefarious intent.

We next discuss another form of analysis that relies on computer modeling to test the effect of placing a legislative line in a particular place. The existing map can be tested by making many small, random changes to the lines drawn in the map, and examining the effect of those changes. With a neutrally drawn map, random changes should not lead to consistent partisan swings in a particular direction—regardless of the distribution of voters geographically. But if small, random changes to legislative district lines lead to consistent changes in the partisan make-up of districts—changes that are extreme outliers in scale—then a court can reliably conclude that the lines were drawn as they were with the predominant intent of creating a partisan gerrymander.

Finally, we discuss forms of statistical analysis that do not require the construction of alternative districting plans. For example, by making a statistical characterization of a State's partisan geography, and the geographic distribution of the voters for the two parties, it is possible to determine what seat shares would be expected from a neutrally drawn map based on that State's political geography. In the event that a redistricting plan demonstrates an unexpectedly high level of partisan asymmetry, this approach allows courts to evaluate the plausibility of the claim that the

partisan advantage is driven by an especially advantageous geographic distribution of that party's voters. Other statistical techniques—some of which have been used for generations, and some of which, like the efficiency gap, are relatively recent—are informative as to both intent and effect as well.

In short, there is no shortage of tools that permit consistent and reliable measurement of partisan gerrymanders, and that support quantitative analysis of both the intent behind the drawing of legislative lines and the effect of a legislative map on voters. Although space does not permit a comprehensive list, the tools described below can inform the Court's analysis of the judicial manageability of quantifying partisan gerrymanders. Using these tools, the Court can confidently determine, on a district-by-district basis, when an intentional and durable political gerrymander has occurred.

I. PARTISAN GERRYMANDERING CAN BE RELIABLY MEASURED USING A VARIETY OF TOOLS.

Comparison to a Set of Alternative Maps. One well-known means of testing a legislative map for partisan gerrymandering is comparison of the map to a large set—thousands, millions, or more—of computer-generated maps drawn using partisan-neutral criteria. This test, which was applied by experts in this case, examines the effects of legislative line-drawing by comparing actual election results under the as-drawn map to results that would have occurred under a set of alternative maps with neutrally drawn district lines. By comparing an existing map to a set of automatically generated maps, a court can determine whether the as-drawn map is an extreme outlier that cannot be explained by neutral factors, such as the geographical distribution of voters

within a State. If the effects are far more extreme than anything that results in a set of neutrally drawn alternatives, then the intent to engage in invidious partisan gerrymandering can be inferred. As the Fourth Circuit explained, "if a computer randomly draws five hundred redistricting plans following traditional redistricting criteria, and the actual enacted plans fall completely outside the range of what the computer has drawn, one can conclude that the traditional criteria do not explain that enacted plan." *Raleigh Wake Citizens Ass'n* v. *Wake Cty. Bd. of Elections*, 827 F.3d 333, 344 (4th Cir. 2016).[9]

Numerous scholars have used comparisons of legislative maps to a set of computer-generated alternative maps to assess partisan gerrymandering. See Br. of Dr. Eric Lander as *Amicus Curiae* 31–33 & nn.35–38 (listing "many distinguished computational scientists actively applying" similar methods, and gathering citations). Although different scholars use somewhat different techniques, the process for analyzing a potentially gerrymandered districting map begins with a computer generating a large set of hundreds, thousands, or more simulated districting maps for a State. See, *e.g.*, Chen & Rodden, *Redistricting Simulations*, *supra* note 3, at 335; Herschlag et al., *supra* note 7; Wendy K. Tam Cho & Yan Y. Liu, *Toward a Talismanic Redistricting Tool: A Computational Method for Identifying Extreme Redistricting Plans*, 15 Election L.J. 351 (2016). In drawing the simulated legislative boundaries, the

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[9] This approach was first introduced in state court, by the plaintiffs in *Romo* v. *Detzner*, filed in the Circuit Court of Florida. *See Romo* v. *Detzner*, No. 2012-CA-000412, 2014 WL 3797315 (Fla. Cir. Ct. July 10, 2014). More recently, the Supreme Court of Pennsylvania relied upon this analysis in its decision in *League of Women Voters* v. *Commonwealth*, 178 A.3d 737 (Pa. 2018).

computer can be programmed, as appropriate to the analysis in question, to optimize several traditional districting criteria relevant to the State at issue, such as population equality (to conform to the principle of one person, one vote), preservation of county and municipal boundaries, any Voting Rights Act requirements, and geographic compactness. *E.g.*, Chen & Rodden, *Redistricting Simulations*, *supra* note 3, at 335–38. Then, using actual election results, the partisan effects of these simulated maps are compared to the partisan effects of the actual map. *Id.* at 339–40. If the enacted plan exhibits greater partisan asymmetry than a large majority or all of the simulations, courts can conclude that traditional principles and political geography alone cannot explain the map's disproportionate partisan advantage. See *Raleigh Wake Citizens Ass'n*, 827 F.3d at 344.

The method of comparing a legislative map to a set of alternative maps offers several advantages. First, comparison to alternative maps automatically accounts for a State's political geography. Because the alternative maps are drawn using the actual geographical distribution of voters in the State, the set of alternative maps necessarily reflects any clustering of one party's voters within the State. If, for example, Democratic voters cluster in cities, then the set of alternative maps will produce urban districts in which Democrats are clustered. Thus, the concern raised by Appellants that "false positives" might result in quantitative tests for gerrymandering where "Democratic voters are concentrated in or near urban areas while Republican voters are more evenly distributed" does not apply. Br. for Appellants 44. Indeed, in an early quantitative analysis of legislative maps by *amicus* Professor Rodden along with

Professor Chen, the authors used comparisons of legislative maps to alternative maps to show quantitatively that in many U.S. states, the application of traditional districting principles will naturally produce some level of bias in favor of the Republican Party, solely as a result of voter distribution. Chen & Rodden, *Unintentional Gerrymandering*, *supra* note 3, at 241–42.

Additionally, this method permits analysis of legislative district lines at both the statewide and district level—allowing the court to assess not only whether the statewide map is a partisan gerrymander, but also whether individual districts are packed or cracked. See *Gill*, 138 S. Ct. at 1931 (to have standing to pursue a vote dilution theory, plaintiff must establish that she resides in a packed or cracked district). In a statewide analysis, actual election results under the statewide legislative map are compared to simulated election results under the full set of alternative maps. If the actual election results are far more lopsided than the vast majority of simulated results from alternative maps, then the legislative map is an extreme outlier that cannot be explained by neutral criteria.

This form of analysis can also identify whether individual districts are packed or cracked. To conduct the district-focused analysis, the distribution of each party's voters in each district is calculated over the full set of alternative maps. These numbers are then compared to the partisan makeup of each district in the actual map. If packing occurs to disfavor Democratic voters (for example), then the most heavily Democratic-leaning districts will show an *even greater* Democratic lean in the actual map than in all or the vast majority of alternative maps. The analysis thus demonstrates that Democratic voters are packed into

those districts. If cracking occurs to disfavor Democrats, then those districts in which votes are relatively evenly distributed between parties in the actual map will show a *lower* Democratic make-up in those districts than in all or the vast majority of alternative maps. The analysis thus demonstrates that Democratic voters are cracked out of those districts. A chart illustrating the findings of Professor Jonathan C. Mattingly, one of the experts below, using this form of analysis is reproduced in the Brief for Common Cause Appellees (at 15). As Professor Mattingly showed, comparison of North Carolina's 2016 Plan to a set of 24,000 neutrally drawn maps showed that at least six districts were extreme outliers, and thus shown to be either packed or cracked. *Id.* at 14–16, 31.

Finally, comparison of a legislative map to alternative maps is a familiar and comprehensible approach. It is well within courts' adjudicative capacity to identify the effects of partisan gerrymandering, and to infer that a map is drawn with the predominant intent to favor voters of one party over the other, where the map is an extreme statistical outlier. Indeed, courts need not settle on an "ideal" legislative map or an "appropriate" degree of partisan bias in the drawing of a legislative map to make use of this tool. Instead, when courts are confronted with a legislative map that is an extreme outlier as compared to a universe of neutrally drawn maps, they can simply conclude that "however much you think is too much, this case is too much." Transcript of Oral Argument at 39, *Benisek* v. *Lamone*, 138 S. Ct. 1942 (2018) (per curiam) (No. 17-333).

Justice Kagan recognized as much in *Gill*, explaining that the showing that a legislative map disfavors a voter as compared to neutrally drawn maps

"will not be hard to make." 138 S. Ct. at 1936 (Kagan, J., concurring). Nor will it be hard for the voting public to understand: "The point is that the plaintiff can show, through drawing alternative district lines, that partisan-based packing or cracking diluted her vote." *Id.*

Measuring Effects of Slight Changes to District Lines. Another use of computer simulations looks more directly at intent—examining *why* district lines were drawn where they were. This type of analysis looks at small, random changes to existing district lines to determine whether the lines as drawn constitute extreme outliers. If small, random changes produce statistically outsized effects, then it is possible to conclude that the lines were deliberately drawn in a precise location so as to maximize partisan advantage. See Herschlag et al., *supra* note 7, at 7 ("If relatively small changes in a redistricting dramatically change the partisan vote balance in each district then it raises questions how representative the results generated by the redistricting are, and suggests the redistricting was selected or engineered.").

Again, multiple scholars have developed various techniques to conduct this form of analysis.[10] One example is an approach developed by *amicus* Professor Pegden, along with Professors Maria Chikina and Alan Frieze. Chikina et al., *supra* note 5. Instead of generating alternative maps from scratch, their method starts with the actual legislative map and uses a computer to examine the effects of billions of small, random changes to the existing district lines, which

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[10] *See* Chikina et al., *supra* note 5; Herschlag et al., *supra* note 7, at 7; Jonathan C. Mattingly & Christy Vaughn, *Redistricting and the Will of the People* (Oct. 29, 2014) (unpublished paper), https://arxiv.org/abs/1410.8796.

permits them to compare the actual map to *all* possible maps that satisfy traditional redistricting criteria. Professor Mattingly and several colleagues use a different technique to conduct a comparable analysis: they compare the placement of actual district lines to placement of lines in the subset of alternative district maps that are "nearby" (*i.e.*, drawn similarly to) the actual map. Herschlag et al., *supra* note 7, at 7, 20–21.

This form of analysis offers many of the same advantages as comparison to a dataset of alternative maps. Like that technique, examination of small, random changes to district lines naturally accounts for a State's political geography: Because it uses the actual placement of voters in assessing the effects of small, random changes in line-drawing, there is no risk of "false positives" due to geographical distribution of voters. Analyzing small, random changes in addition to a broader alternative-maps analysis also offers a useful confirmation that the set of alternative maps was properly constructed. See Wang et al., *Antidote for Gobbledygook*, *supra* note 6, at 310–12.

The small-changes analysis also offers the advantage of being easily described and understood. Indeed, it is another take on the alternative map comparison that Justice Kagan described: Pointing out that the precise placement of district lines was deliberately selected to maximize partisan advantage is another way to demonstrate "through drawing alternative district lines, that partisan-based packing or cracking diluted [a plaintiff's] vote." *Gill*, 138 S. Ct. at 1936 (Kagan, J., concurring).

Other Statistical Tools. It is also possible to analyze partisan gerrymandering without reliance on computer modeling—and many scholars do so using techniques new and old. As Professor Wang and others

have described, these statistical measures have a variety of uses and can be deployed as appropriate based on the characteristics of the State under consideration. See generally Wang et al., *Antidote for Gobbledygook*, *supra* note 6 (describing and categorizing "methods for detecting extremes" that "comprise a statistical toolbox to address a wide variety of circumstances").

For example, the "neighborhood" approach developed by Professors Rodden and Nicholas Eubank, assesses the role that a State's political geography plays in determining election outcomes. See Eubank & Rodden, *Who Is My Neighbor?*, *supra* note 4. Instead of simulating a series of alternative maps, this technique uses precinct-level election results to generate a bespoke "neighborhood" for each voter that corresponds to the size of the relevant legislative districts. The partisanship of each voter's nearest neighbors can then be contrasted with that of the enacted district in which the voter is situated. This allows for the identification of "hotspots" where clusters of co-partisans have been excessively "packed" relative to the underlying geography of partisanship, and likewise, areas where neighborhoods of co-partisans have been "cracked" in order to prevent them from forming majorities in the enacted plan. In this way, the representational harm associated with gerrymandering can be assessed at a very disaggregated spatial scale. This analysis can also be scaled up to characterize the level of "packing" and "cracking" in a State, and can facilitate useful cross-state comparisons.

Other longstanding statistical techniques are likewise informative in determining whether a legislative map constitutes an extreme outlier—and thus supports a finding of intent to gerrymander. The

mean-median approach tests for consistent advantage and works well to assess gerrymandering in closely divided states, such as North Carolina. See Wang et al., *Antidote for Gobbledygook*, *supra* note 6, at 309–10. Where both parties are treated similarly, the mean vote share for each party across all districts should be similar to the median vote share. Where the mean-median difference is large, however, then one party has gained a consistent advantage at the district level. *Id.* The chi-squared test—another longstanding statistical test—can be used in states heavily dominated by one political party, such as Maryland. *Id.* at 310. The test examines whether results are unexpectedly uniform (which indicates that the dominant party has deliberately drawn lines so as to ensure reliable wins in every district) or more heterogeneous, as would be expected from a map drawn with nonpartisan intent. *Id.*

The efficiency gap also provides a simple and intuitive calculation for measuring the effects of a legislative map without computer modeling. The efficiency gap examines how many votes were cast for either party and the seats that were won as a consequence—and measures the portion of votes that each party has "wasted."[11] Although both parties necessarily waste some votes, an extreme efficiency gap indicates severe partisan asymmetry. When applied in states like North Carolina, Wisconsin, and Pennsylvania, inferences drawn from the efficiency gap are quite similar to those drawn from the mean-median approach and several others. Appellants criticize the efficiency gap for not taking account of political geography, see Br. for Appellants 44, but this

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[11] *See* Nicholas O. Stephanopoulos & Eric M. McGhee, *Partisan Gerrymandering and the Efficiency Gap*, 82 U. Chi. L. Rev. 831 (2015).

is a question that the efficiency gap simply is not designed to measure. To the contrary, that test's creators emphasize that any presumption of gerrymandering from a high efficiency gap can be rebutted by a showing that "the state's underlying political geography" explains the outcome. Stephanopoulos & McGhee, *supra* note 11, at 837–38. When used in conjunction with other measures that permit the assessment of the effects of political geography, the efficiency gap offers a concise measurement that summarizes the degree of partisan asymmetry in a single number.

As Professor Wang and his colleagues have described, together, these measures offer courts a toolkit for assessing both whether a map creates inequality of electoral opportunity, and whether it creates a durable, inequitable outcome. Wang et al., *Antidote for Gobbledygook*, *supra* note 6, at 305–06. They permit courts—in a rigorous, objective, and replicable manner—to assess whether partisan asymmetry in an electoral map results from partisan geography or malicious cartography, and provide powerful evidence of intentional gerrymandering. Just as a plumb or a spirit level may both be used by a carpenter to diagnose a crooked table, these tests likewise all have a place in the court's toolkit. This Court need not settle on one test for partisan gerrymandering—but instead can take comfort that lower courts have multiple reliable, quantitative tools with which to identify extreme outliers, and thereby confront the problem of partisan gerrymandering.

II. RELIABLE QUANTITATIVE ANALYSIS IN THE CASE BELOW CONFIRMS THAT NORTH CAROLINA'S LEGISLATIVE MAP IS A PARTISAN GERRYMANDER.

As Appellees explain, the factual history of North Carolina's 2016 Plan makes clear that it was expressly intended to achieve a quota of ten Republican and three Democratic districts, despite a near-equal split among the State's voters. The map-drawer drew the map in order to adhere to this partisan goal, packing Democrats into three blue districts and cracking the remaining across ten red districts. Br. for Common Cause Appellees 5–8; Br. for Appellees League of Women Voters of North Carolina 7–8; App. to Jurisdictional Statement ("App.") 17, 158–159.

The effects of this plan were obvious and immediate. In the 2016 election (the first after the Plan went into effect), Republicans prevailed in all ten "cracked" districts and Democrats prevailed in the three "packed" districts. App. 26. Republicans received just 53% of the statewide vote but won 77% of the total seats. *Id.* There was not a single district with a competitive race. App. 190. The Plan's effects were obvious again in the 2018 elections: Despite Republican candidates receiving only 50.3% of the vote, they again won 10 seats (77%). Suppl. Br. of the Common Cause Appellees 4. In the twelve contested races, Democrats won the majority of the total vote (50.9%) but won only 3 of 12 seats, or 25%. *Id.*

Appellees sued in 2016, alleging that the Plan was an unconstitutional gerrymander, and a three-judge panel of the Middle District of North Carolina held that it was. On remand following *Gill*, the majority held that 12 of the Plan's 13 districts violate the Equal Protection Clause, the First Amendment and Sections 2 and 4 of Article I.

In addition to finding that the Plan was intended to "dictate [federal] electoral outcomes," App. 303, the court found that the Plan's dilutionary effects were not "justified by a legitimate state districting interest or neutral explanation." App. 215. In addressing one of Appellants' justifications for the 2016 Plan's discriminatory effect—"North Carolina's political geography, which reflects the 'natural packing' of Democratic voters" —the court found that Appellants failed to provide "any contrary empirical analysis showing that the state's political geography does, in fact, explain the 2016 Plan's discriminatory effects." App. 215–218.

The three-judge court's finding on justification was correct. It is true, as Appellants argued below and they and their *amici* continue to argue now, that in some states, the concentration of Democrats in urban areas can, under some conditions, create natural Republican advantage based on political geography. See Br. for Appellants 44; Br. for *Amici Curiae* Wisconsin State Senate & Wisconsin State Assembly Supp. Appellants 10. But political geography falls far short of explaining the highly disproportionate election results under the Plan. The techniques described above allow this conclusion to be drawn beyond any statistical doubt. And the district court did just that, relying on quantitative analyses offered by Professors Chen and Mattingly to conclude that the 2016 Plan "is an extreme statistical outlier in terms of its partisanship." App. 170 (quoting Trial Tr. I, at 213:22–23).

The Briefs for Appellees thoroughly describe the robust, quantitative analyses that Professors Chen and Mattingly offered in the case below. Br. for Common Cause Appellees 13–17; Br. for Appellees League of Women Voters of North Carolina 18–19.

Those analyses conclusively and consistently demonstrated that the effect of North Carolina's 2016 Plan was to severely and durably disadvantage the Democratic Party and Democratic voters in North Carolina. In this case, therefore—just as in *Gill*—the analytical methods for measuring the effect of political geography uniformly support one conclusion: that the 2016 Plan is an intentional partisan gerrymander.

Nor can hand-waving statements about political geography in general explain the 2016 Plan's elector bias, as Appellants and their *amici* contend. See Br. for Appellants 44; Br. for *Amici Curiae* Wisconsin State Senate & Wisconsin State Assembly Supp. Appellants 10–15. The techniques described in Part I enable a determination of whether partisan asymmetry is explained by the neutral factor of political geography. The computer-based techniques described in Part I test—indeed, show to a statistical certainty—whether the partisan distribution of seats under an enacted redistricting plan is explained by a particular State's natural political geography or instead was obtained through a process of intentional partisan gerrymandering to purposely amplify those natural factors to gain an invidious advantage. The district court expressly relied on such locally-specific evidence.

Compared with the robustness of this evidence, generic arguments that fail to evaluate the effects of North Carolina's specific political geography are not informative. Appellants' vague statement that Democrats are "concentrated" while Republicans are "evenly distributed" does not tell the Court (a) whether the voter distribution is sufficiently disparate to create a pro-Republican bias, (b) if so, the degree of any pro-Republican bias, or (c) most importantly, whether any naturally occurring pro-Republican bias is of sufficient

scope to explain the electoral bias represented in North Carolina's legislative map.[12] Br. for Appellants 44. The techniques described above, however, do.

Each of the techniques described above is, taken alone, powerful evidence of the invidious intent behind North Carolina's districting map. Taken together, these techniques uniformly and unambiguously support the same conclusion: that North Carolina's legislative map is an extreme outlier. The additional evidence of legislative intent to gain partisan advantage marshaled by Appellees leads ineluctably to the same result. This Court can thus conclude with great confidence that, as the district court held, North Carolina's Plan is an invidious partisan gerrymander.

Given the wealth of evidentiary support for the lower court's decision, there is no merit to Appellants' contention that this challenge to North Carolina's map has an adverse impact on "the integrity and independence of the courts." Br. for Appellants 38. In fact, the opposite is true. What was required of the lower court here was to apply constitutional standards to factual findings that were well supported by undisputed evidence. And that is what the court did.

Contrary to Appellants' contention, the district court's decision marks a clear example of the *exercise* of judicial independence and integrity. Indeed, it is shying away from the conclusion compelled by reliable,

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[12] Appellants' vague statements about the concentration of Democrats in cities are based on a misunderstanding of the academic literature. The concentration of Democrats in cities is not a sufficient condition to produce bias in favor of Republicans. The arrangement of electoral districts around those patterns is a crucial factor, as are the size and structure of the cities, nature of suburbanization, and the presence of rural Democrats. *See* Eubank & Rodden, *Who Is My Neighbor?*, *supra* note 4; Eubank & Rodden, *Political Dislocation*, *supra* note 4.

consistent quantitative analysis—that North Carolina's 2016 Plan is an invidious partisan gerrymander—that would adversely impact the integrity and independence of the judiciary. This Court should not accept Appellants' invitation to do so.

CONCLUSION

As Justice Kennedy suggested at the time of *Vieth*, there now exists a kit of "new technologies" and analytical tools that "make more evident the precise nature" of gerrymandering. *Vieth*, 541 U.S. at 312–13 (Kennedy, J., concurring in the judgment). This Brief identifies several such methods, all of which have the ability to demonstrate that North Carolina's districting map was a partisan gerrymander, specifically designed to "burden[] . . . [the] representational rights" of North Carolina Democrats. *Id.* The Court should affirm.

Respectfully submitted,

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